FIG.9(a)

Electromechanical coupling factors (kp)

Li (mol%) \ Ta (mol%)	0	10	20	30	40
20	0.092	0.170	0.187	0.150	0.160
15	0.087	0.203	0.230	0.209	0.204
10	0.151	0.292	0.307	0.292	0.283
8	0.196	0.340	0.335	0.313	0.287
6	0.332	0.415	0.383	0.406	0.336
4	0.371	0.456	0.501	0.431	0.382
2	0.469	0.395	0.341	0.380	0.330
0	0.334	0.453	0.465	0.332	0.294

FIG.9(b)

Piezoelectric constant (d31 pm/V)

Li (mol%) \ Ta (mol%)	0	10	20	30	40
20	9.7	20.2	21.5	16.4	17.3
15	10.1	23.2	25.1	23.7	22.0
10	20.4	39.6	36.3	32.5	33.2
8	27.5	50.8	46.1	41.2	35.6
6	57.7	71.0	60.1	58.3	46.3
4	39.8	69.5	95.0	73.1	63.5
2	46.9	51.4	54.3	79.3	70.1
0	37.6	49.5	60.5	62.9	66.0

FIG.9(c)

Piezoelectric constant (g31 10^{-3}Vm/N)

Li (mol%) \ Ta (mol%)	0	10	20	30	40
20	2.8	4.2	4.5	3.7	3.6
15	2.2	4.8	5.4	4.6	4.6
10	3.5	6.7	6.6	6.6	6.3
8	4.7	6.8	6.8	6.1	6.4
6	7.5	7.9	7.1	7.7	6.0
4	11.0	10.3	9.0	7.5	6.2
2	14.5	9.3	6.8	6.1	4.7
0	9.9	12.1	10.5	6.0	4.1

FIG.10(a)

Curie point (°C)

Li (mol%) \ Ta (mol%)	0	10	20	30	40
20	505	459	390	347	295
15	502	450	385	337	280
10	499	450	380	330	262
8	485	420	363	310	250
6	474	405	345	295	235
4	460	393	337	279	220
2	435	375	308	250	192
0	415	350	285	233	168

FIG.10(b)

Dielectric constant (E33t)

Li (mol%) \ Ta (mol%)	0	10	20	30	40
20	399	540	539	504	542
15	530	544	521	580	546
10	657	672	624	556	599
8	657	847	762	761	625
6	864	1014	959	855	868
4	409	763	1204	1106	1165
2	364	621	903	1466	1686
0	429	462	652	1187	1837

FIG.10(c)

Dielectric loss (tanδ)

Li (mol%) \ Ta (mol%)	0	10	20	30	40
20	0.091	0.015	0.011	0.014	0.008
15	0.045	0.022	0.007	0.007	0.008
10	0.088	0.039	0.007	0.007	0.008
8	0.037	0.010	0.010	0.008	0.011
6	0.050	0.008	0.006	0.009	0.011
4	0.014	0.014	0.008	0.006	0.014
2	0.003	0.023	0.018	0.016	0.018
0	0.036	0.005	0.010	0.012	0.009

Table 3

The results of the measurement of KNN-LT
(one hour passed after the poling)

	A Sample of the invention Sample No. 2	A Comparative Sample Base sample	
Sample name	KNN-LT	KNN	
A composition formula	$\{(K_{0.5}Na_{0.5})_{0.9}Li_{0.1}\}(Nb_{0.8}Ta_{0.2})O_3$	$K_{0.5}Na_{0.5}NbO_3$	
Measurement Item			
Relative density (%)	99.0	96.2	
Piezoelectric properties			
Electromechanical coupling factors (kp)	0.307	0.334	
Piezoelectric constant (d31 pm/V)	36.3	37.6	
Piezoelectric constant (d33 pm/V)	104	115	
Piezoelectric constant (g31 10^{-3}Vm/N)	6.57	9.90	
Piezoelectric constant (g33 10^{-3}Vm/N)	11.9	30.3	
Elastic properties			
Mechanical quality factor (Qm)	273.4	100.6	*
Dielectric property			
Dielectric constant (E33t)	624	429	
Dielectric loss (tanδ)	0.0071	0.0356	*
Phase transition temperature			
Curie point (°C)	380	415	
Phase transition temperature (Ortho → Tetra)	NONE	210	*
Temperature coefficient			
Dielectric constant (%/-50 to 100 °C)	10	93	*
Resistivity (Ω·cm)	3.15E + 10	7.67E + 10	

* Properties improved by Li, Ta

Table 4

The results of the measurement of KNN-LT
(28 days passed after the poling)

	A Sample of the invention Sample No. 2	A Comparative Sample Base sample	
Sample name	KNN-LT	KNN	
A composition formula	$\{(K_{0.5}Na_{0.5})_{0.9}Li_{0.1}\}(Nb_{0.8}Ta_{0.2})O_3$	$K_{0.5}Na_{0.5}NbO_3$	
Measurement Item			
Relative density (%)	99.0	96.2	
Piezoelectric properties			
Electromechanical coupling factors (kp)	0.290	0.329	
Piezoelectric constant (d31 pm/V)	33.4	38.6	
Piezoelectric constant (d33 pm/V)	104	115	
Piezoelectric constant (g31 10^{-3}Vm/N)	6.23	9.30	
Piezoelectric constant (g33 10^{-3}Vm/N)	11.6	30.3	
Elastic properties			
Mechanical quality factor (Qm)	360.1	85.6	*
Dielectric property			
Dielectric constant (E33t)	606	470	
Dielectric loss (tanδ)	0.0070	0.0890	*
Phase transition temperature			
Curie point (°C)	380	415	
Phase transition temperature (Ortho → Tetra)	NONE	210	*
Temperature coefficient			
Dielectric constant (%/-50 to 100 °C)	10	93	*
Resistivity (Ω·cm)	3.15E + 10	7.67E + 10	

* Properties improved by Li, Ta